

Claims

1. A charge control circuit for a battery pack comprising rechargeable battery elements (9) which
5 are arranged in respective parallel branches (3) of a parallel circuit of battery voltage sources, characterized
in that each parallel branch (3) has associated state monitoring means (11, 13, 17) for monitoring
10 the battery state of the battery voltage source represented by the parallel branch (3) during a charging process of the battery pack, and in that a respective switch (15), which can be controlled by the state monitoring means (11, 13, 17), is
15 provided in each parallel branch (3) for interrupting or releasing the charge current flow through the parallel branch (3) on the basis of the battery state.
- 20 2. The charge control circuit as claimed in claim 1, characterized in that the state monitoring means (11, 13, 17) of a parallel branch (3) are set to switch the controllable switch (15) to the interrupted state when it detects a battery state
25 "parallel branch fully charged".
3. The charge control circuit as claimed in claim 1 or 2,
characterized in that the parallel branch (3) are
30 formed from identical groups of series-connected battery elements (9) which are connected in series with the respective controlled switch (15).
4. The charge control circuit as claimed in one of
35 the preceding claims, characterized in that the state monitoring means (11, 13, 17) comprise temperature sensors (11) for detecting the battery temperature in the individual parallel branches (3).

5. The charge control circuit as claimed in claim 4,
characterized in that the state monitoring means
(11, 13, 17) of a relevant parallel branch (3) are
5 set to switch the controllable switch (15) of the
parallel branch (3) to the interrupted state when
the battery temperature detected by the
temperature sensor (11) in the parallel branch (3)
exceeds a predetermined temperature value.
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6. The charge control circuit as claimed in one of
the preceding claims,
characterized in that the state monitoring means
(11, 13, 17) comprise current measuring devices
15 (13, 17) for detecting the current flowing through
the individual parallel branch (3).
7. The charge control circuit as claimed in claim 6,
characterized in that the state monitoring means
20 (11, 13, 17) are set to switch the controllable
switch (15) of the relevant parallel branch to the
interrupted state when the charge current flowing
through the parallel branch (3) exceeds a
predetermined current value for the duration of a
25 predetermined time interval.
8. The charge control circuit as claimed in one of
the preceding claims,
characterized in that the state monitoring means
30 (11, 13, 17) are set to switch the controllable
switch (15) of the respective parallel branch (3)
to the interrupted state when the change in the
battery temperature per unit time exceeds a
comparison value depending on the respective
35 charge current through the parallel branch (3).
9. The charge control circuit as claimed in one of
the preceding claims,

characterized in that the state monitoring means (11, 13, 17) comprise a safety timer (13), and in that the state monitoring means (11, 13, 17) switch the controllable switch of the respective parallel branch to the interrupted state when a charge time interval, which is determined by the timer (13) on the basis of the charge current flowing through the relevant parallel branch (3), has expired.

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10. The charge control circuit as claimed in one of the preceding claims, characterized in that the state monitoring means (11, 13, 17) comprise a respective microprocessor (13) per parallel branch (3) for the purpose of controlling the respective switch (15).

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11. A discharge control circuit for a battery pack comprising rechargeable battery elements (9), which are arranged in respective parallel branches of a parallel circuit of battery voltage sources (3),

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characterized in that each parallel branch, in series with the battery voltage source (3) comprising one or more battery elements (9) which is represented by it, has a respective controllable switch (15) having an integrated diode (23), or one which is connected in parallel therewith, which is conductive in the discharge current flow direction, state monitoring means (13) being provided and set so as to switch the controllable switch (15) from a high-resistance state to a low-resistance state when a discharge current having a minimum current level flows through the diode (23).

12. The discharge control circuit as claimed in claim 11,

characterized in that the controllable switches (15) are transistors, in particular field-effect transistors.

- 5 13. The discharge control circuit as claimed in claim
11 or 12,
characterized in that the state monitoring means
comprise at least one microprocessor (13, 19),
preferably at least in each case one
10 microprocessor (13) for each parallel branch (3).
14. A battery control circuit, comprising the charge
control circuit as claimed in one of claims 1 - 10
and the discharge control circuit as claimed in
15 one of claims 11 - 13 combined therewith.
15. A battery pack having the charge control circuit
as claimed in one of claims 1 - 10 integrated
therein and/or having the discharge control
20 circuit as claimed in one of claims 11 - 13.